REMARKS

In the Official Action mailed 27 December 2005, the Examiner reviewed claims 9-28. The Examiner has rejected claim 9 for double patenting; has rejected claim 9 under 35 U.S.C. §103(a); has rejected claim 17 under 35 U.S.C. §103(a); has rejected claim 10 under 35 U.S.C. §103(a); has rejected claims 12 and 13 under 35 U.S.C. §103(a); has rejected claims 14-16 under 35 U.S.C. §103(a); has rejected claims 18 and 20 under 35 U.S.C. §103(a); has rejected claims 19 and 21 under 35 U.S.C. §103(a); has rejected claim 25 under 35 U.S.C. §103(a); has rejected claims 26-28 under 35 U.S.C. §103(a); and has rejected claims 22-24 under 35 U.S.C. §103(a).

Applicant has amended claim 9, and canceled claim 13. Claims 9-12 and 14-28 remain pending.

The rejections are respectfully traversed below, and reconsideration is requested.

Rejection of Claim 9 for Double Patenting

The Examiner has rejected claim 9 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 5239408 ('408 Patent) in view of Farmer (USP No. 3724930). Applicant has amended claim 9 without loss of scope, to clarify the purpose of the baffle.

The Examiner acknowledges that the '408 Patent does not teach a baffle in the relay telescope in the optical path of a multipass amplifier as claimed herein. The Examiner argues that the limitations related to a baffle in claim 9 of the present application consist of "limitations directed to a variant that would have been obvious ..." As evidence that the limitations related to the baffle are merely directed to an obvious variant, the Examiner cites Farmer, which describes a spatial filter in the path of the output of a high power laser.

Applicant respectfully requests reconsideration, because the combination relied upon by the Examiner does not yield the claimed invention for at least three reasons, and because there is no evidence suggesting that the persons of skill in the art would believe that the use of a spatial filter as taught by Farmer would have a reasonable likelihood to succeed in solving the problems of the present invention, or in being operable at all in the system of the '408 Patent.

First, the claims require a baffle in a relay telescope within the cavity of a multi-pass amplifier. The spatial filter of Farmer is not a variant of an intra-cavity relay telescope as claimed herein. Farmer teaches that if one intended to filter the beam produced by the multi-pass amplifier of the '408 Patent, Farmer suggests adding a filter outside the optical cavity, rather

than replacing the claimed intra-cavity relay telescope with Farmer's spatial filter. Thus, the combination relied upon by the Examiner does not yield the claimed invention. The only possible motivation for modifying the intra-cavity relay telescope of the '408 Patent claims is the present application.

Second, the combination would not yield the structure recited in claim 9 for an additional reason. In particular, claim 9 requires that the baffle include a "... member having an optically transparent channel, the optically transparent channel having openings on opposite ends of the solid member, and a waist within the solid member near said telescope focal point, said waist being smaller than said openings, and said channel having sides which taper near said waist." There is no similar structure in the pinhole of Farmer.

Third, Farmer teaches a pinhole spatial filter, which is significantly different that the baffle structure claimed herein. A spatial filter is typically comprised of a plane of material with a hole smaller than the physical size of the beam at the focus of the associated lens. The plane of material blocks all light except for that allowed to pass through the hole. The filter is designed to work with a single laser beam and block or filter out portions of that beam so as to modify the basic mode structure or other acquired structural content of the laser beam, therefore improving its wavefront and intensity distribution. The size of the hole determines the amount of filtering. To filter, the hole needs to be smaller than the basic extent of the laser beam. For a laser output with multiple spatial modes, the spatial filter can eliminate high order modes and even filter down to the lowest order, TEM00 mode. It can also filter out structure acquired by an output beam as Farmer mentions by "dust and scratches on the optical elements". By adjusting the physical dimensions of the hole in the spatial filter and adjusting its position relative to the beam being filtered, unwanted components of the beam can be removed. For example, a dust particle on a lens will scatter light that will appear as a broad spot, much larger than the hole in the spatial filter at the lens focus. The spatial filter will almost entirely block this scattered light and transmit a beam that appears free of this blemish. If one sets up a spatial filter in a beam with a specific pinhole size and the high power of the beam heats the material of the pinhole or ablates away materials and enlarges the hole, then the spatial filter will no longer filter the light as originally intended. Again the key is that a spatial filter is smaller than the beam and hence Farmer's concern with a mechanism of cooling the aperture.

A baffle, in contrast to a spatial filter, is constructed with a hole that is larger than the basic physical extent of the beam. It is not intended to filter the beam but quite the opposite, is

specifically designed to pass the desired beam and not change its spatial characteristics in the least. A baffle is intended to pass the desired beam and block other unwanted beams. See, specification of the present application, paragraph [0046], page 15, lines 8-10. In a high power laser, a baffle must operate without being ablated (eroded) by the high power of the unwanted beams resulting which could create new holes that allow the unwanted beams to transmit. Additionally, if the unwanted beams can cause ablation on areas of the baffle, the ablation by-products can travel to the optics and coat and damage these optics.

The claimed baffle allows the desired beam to pass, unfiltered in any significant way to the phase conjugator and at the same time to block or "baffle out" other stray beams that may have been generated. Stray beams are generated for example from reflections off of lenses or other optics that are in the propagation path. These reflected beams can be either propagating with or counter propagating to the main beam but in slightly different directions or at slightly different focal positions and focal lengths. They are deleterious to the laser and amplifier operation and must be blocked without blocking the main beam by any significant amount.

Therefore, even if one were to apply the spatial filter of Farmer in place of the baffled, intra-cavity relay telescope claimed herein, the claimed combination would not include a baffle having the claimed structure, and would not result in modification of an intra-cavity relay telescope as claimed herein. Therefore, the combination does not satisfy the requirements of a *prima facie* case of unpatentability.

Furthermore, there is no evidence in the record that modifying the pinhole aperture described by Farmer would work in a high power laser amplifier. Before inventing the current baffle, the inventors herein made baffle apertures, similar to an enlarged version of the pinhole in the spatial filter of Farmer, out of temperature resistant material such as tungsten (a refractory metal). The high power laser easily burned through. A modified pinhole aperture fashioned as a baffle with a large central hole, could not achieve sufficient lifetime in high power lasers because stray beams burned through it in a very short time. Thus, even if one were to take the position that the pinhole of Farmer's spatial filter is a "baffle" as claimed herein, and then the result of applying Farmer in place of the intra-cavity relay telescope would be inoperable because the ablation would destroy the baffle operation and would result in formation of deposits of the residue on the components of the relay telescope.

In a very high power laser, stray beams other than the main beam can be very intense and will easily burn through a normal aperture, even one with electrostatic cooling applied such as

defined by Farmer. If modifying the pinhole in the spatial filter of Farmer by opening it up to be a baffle, the stray beams in a powerful laser amplifier, such as described in the present application, would rapidly ablate multiple holes through the baffle and the leaked beams would not be controlled and would amplify and damage elements in the laser.

Accordingly, reconsideration of the rejection of claim 9 as amended is respectfully requested.

Rejection of Claim 9 Under 35 U.S.C. §103(a)

The Examiner has rejected claim 9 under 35 U.S.C. §103(a) as being unpatentable over the '408 Patent in view of Farmer. Applicant requests reconsideration for the reasons discussed above in connection with the obviousness type double patenting rejection.

Accordingly, reconsideration of the rejection of claim 9 as amended is respectfully requested.

Rejection of Claim 17 Under 35 U.S.C. §103(a)

The Examiner has rejected claim 17 under 35 U.S.C. §103(a) as being unpatentable over the '408 Patent in view of Gohil. Applicant requests reconsideration, because the Examiner's prima facie case is based on mistakes in fact. In particular, the combination relied upon by the Examiner does not teach all the limitations of claim 17, including at least the following:

a kinematic mount within the vacuum chamber, adapted to secure beam baffles near the common focal point; and

an access port on the vacuum chamber, adapted for insertion and removal of beam baffles.

The Examiner acknowledges that the '408 Patent does not describe the use of the kinematic mount and an access port adapted for insertion and removal of beam baffles. The Examiner relies upon Gohil to provide the missing elements based upon mistakes in fact.

Gohil describes an x-ray lithography system for integrated circuit manufacturing, that includes an imaging telescope for lithographically transferring an image of a mask 8 onto photoresist on a wafer 9. A laser is used to produce a plasma plume 6 which illuminates photoresist through the mask.

The Examiner identifies the pyrex window 5 in Gohil as an access port. This is clearly mistaken. There is no suggestion in Gohil that the pyrex window is adapted for insertion and

removal of a beam baffle. The Examiner relies upon the mask 8 in Gohil as a baffle, and the alignment mount 10 which holds the semiconductor wafer as the kinematic mount. Again, this is clearly mistaken. The alignment mount 10 holds the wafer. There is no suggestion in Gohil that the mask 8 is supported by the alignment mount 10. Furthermore, there is no suggestion that the pyrex window 5 is used for insertion and removal of a mask 8.

The lithography system of Gohil teaches mounting and alignment of a mask and a wafer in an imaging system. Claim 17 on the other hand relates to an architecture for a high power laser amplifier. There is no suggestion in the references that the alignment mount 10 for a wafer as taught in Gohil could be applied within a relay telescope in a laser amplifier as recited in claim 17. Therefore, the Examiner's *prima facie* case is based on mistakes in fact, and applicant respectfully requests reconsideration.

Accordingly, reconsideration of the rejection of claim 17 is respectfully requested.

Rejection of Claim 10 Under 35 U.S.C. §103(a)

The Examiner has rejected claim 10 under 35 U.S.C. §103(a) as being unpatentable over the '408 patent in view of Farmer as applied to claim 9 above, and further in view of Reinhard. Applicant submits that claim 10 is allowable for at least the same reasons as claim 9, from which it depends. Furthermore, the baffle of the present invention uses the sloped sides and extended length to pick off stray beams by absorption without causing significant ablation. The purpose of the sloped sides is to increase the surface area of the region on which the stray beams impact the baffle, and thereby reduce the energy density of the impact and prevent ablation. The slope of the walls in the baffle are unrelated to frequency selection as suggested by Reinhard.

The baffle is sufficiently large that it passes all the spatial frequencies contained in the beam of interest. So Reinhard's teaching of grazing angle being a measure of what frequencies would be allowed to pass through an aperture is irrelevant. The baffle claimed herein passes all spatial frequencies (i.e. angular content of the main beam) through the main hole in the baffle. The baffle does not do any frequency selection, spatial or temporal.

Accordingly, the combination of Reinhard with Farmer would not lead to the invention recited in claim 10.

Accordingly, reconsideration of the rejection of claim 10 is respectfully requested.

Rejection of Claims 12 and 13 under 35 U.S.C. §103(a)

The Examiner has rejected claims 12 and 13 under 35 U.S.C. §103(a) as being unpatentable over '408 and Farmer as applied to claim 9 above, and further in view of Marshall. Applicant cancels claim 13.

Applicant submits that claim 12 is allowable for at least the same reasons as claim 9, from which it depends. Furthermore, the combination of Marshall with the '408 Patent and Farmer, would not yield the invention recited in claim 12. In particular, Marshall describes an optical parametric oscillator OPO that includes non-linear crystals which induce walk off, which reduces overlap of the pump beam and the main beam and reduces conversion efficiency. Thus, Marshall teaches that walk off is undesirable, and would not lead one of skill in the art to modify the amplifier of the '408 Patent.

Accordingly, reconsideration of the rejection of claims 12 and 13 as amended is respectfully requested.

Rejection of Claims 14-16 under 35 U.S.C. §103(a)

The Examiner has rejected claims 14-16 under 35 U.S.C. §103(a) as being unpatentable over the '408 Patent and Farmer as applied to claim 9 above, with the additional limitations of claims 14-16 being found in the '408 Patent. Applicant submits that claims 14-16 are allowable for at least the same reasons as claim 9, from which they depend.

Accordingly, reconsideration of the rejection of claims 14-16 as amended is respectfully requested.

Rejection of Claims 18 and 20 under 35 U.S.C. §103(a)

The Examiner has rejected claims 18 and 20 under 35 U.S.C. §103(a) as being unpatentable over the '408 patent in view of Gohil as applied to claim 17 above, and further in view of Farmer. Applicant submits that claims 18 and 20 are allowable for at least the same reasons as claim 17, from which they depend, and because of the reasons set forth above in connection with the rejection of claim 9.

Accordingly, reconsideration of the rejection of claims 18 and 20 is respectfully requested.

Rejection of Claims 19 and 21 under 35 U.S.C. §103(a)

The Examiner has rejected claims 19 and 21 under 35 U.S.C. §103(a) as being unpatentable over the '408 patent in view of Gohil and Farmer as applied to claims 18 and 20, above, and further in view of Reinhard. Applicant submits that claims 19 and 21 are allowable for at least the same reasons as claim 17, from which they depend, and because of the reasons set forth above in connection with the rejection of claim 10.

Accordingly, reconsideration of the rejection of claims 19 and 21 is respectfully requested.

Rejection of Claim 25 under 35 U.S.C. §103(a)

The Examiner has rejected claim 25 under 35 U.S.C. §103(a) as being unpatentable over '408 and Gohil as applied to claim 17 above, and further in view of Marshall. Applicant submits that claim 25 is allowable for at least the same reasons as claim 17, from which it depends, and because of the reasons set forth above in connection with the rejection of claim 12.

Accordingly, reconsideration of the rejection of claim 25 as amended is respectfully requested.

Rejection of Claims 26-28 under 35 U.S.C. §103(a)

The Examiner has rejected claims 26-28 under 35 U.S.C. §103(a) as being unpatentable over '408 in view of Gohil and Farmer as applied to claims 18 and 20, above, with the additional limitations being found in the Farmer reference. Applicant submits that claims 26-28 are allowable for at least the same reasons as claim 17, from which they depend, and because of the reasons set forth above in connection with the rejection of claim 10.

Accordingly, reconsideration of the rejection of claims 26-28 as amended is respectfully requested.

Rejection of Claims 22-24 under 35 U.S.C. §103(a)

The Examiner has rejected claims 22-24 under 35 U.S.C. §103(a) as being unpatentable over '408 and Gohil as applied to claim 17 above, with the additional limitations of claims 14-16 being found in the Farmer reference. Applicant submits that claims 22-24 are allowable for at least the same reasons as claim 17, from which they depend, and because of the reasons set forth above in connection with the rejection of claim 10.

Accordingly, reconsideration of the rejection of claims 22-24 as amended is respectfully requested.

CONCLUSION

It is respectfully submitted that this application is now in condition for allowance, and such action is requested.

The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 50-0869 (MICI 1004-2).

Respectfully submitted,

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